

(19) Japanese Patent Office (JP) (11) Japanese Patent Application Unexamined (Kokai) Publication
Sho 61-171328

(12) Official Gazette for Unexamined (Kokai) Patent Applications (A)

(51) Int Cl.⁴ Identification code JPO file number (43) Publication date 2 August 1986
5 B 29 D 30/24 8117-4F

Examination Request None Number of Claims 1 (Total 7 pages)

(54) Title of the Invention Radial tyre moulding machine

(21) Application (Tokugan) Sho 60-11009

(22) Application Date 25 January 1985

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10 Description

1. [Title of the Invention]

Radial tyre moulding machine

2. [Claims]

15 Concerning a radial tyre moulding machine
having a hollow shaft movable in the axial
direction, a main shaft inside said hollow shaft with
an inserted front end part protruding out from the
front end part of said hollow shaft, a shaft movable
20 in the axial direction disposed on the extension
axis of said main shaft, a sleeve movable in the
axial direction embedded in the aforementioned
hollow shaft, a right inner side rim flange fixed at
the front end part of the aforementioned hollow
25 shaft, a left inner side rim flange fixed at the front
end part of the aforementioned hollow shaft, a right
outer side rim flange and a left outer side rim
flange, a radial tyre moulding machine
characterised by having a right side lock
30 mechanism engaging on one side of the
aforementioned sleeve and the aforementioned
right inner side rim flange extending from inside of
the aforementioned right outer side rim flange side
member to the inside and outside in a radial
35 direction, a left side lock mechanism engaging on
one side of the aforementioned shaft and the
aforementioned left inner side rim flange extending
from inside of the aforementioned left outer side
rim flange side member to the inside and outside in
40 a radial direction, a locking member disposed on
the opposite surface to the aforementioned right
inner side rim flange and aforementioned right
outer side rim flange, and a locking member
disposed on the opposite surface to the
45 aforementioned left inner side rim flange and
aforementioned left outer side rim flange.

3. [Detailed Description of the Invention]

(Industrial Field of Application)

50 The present invention relates to a radial tyre
moulding machine.
(Prior Art)

Although tyres moulded in a radial tyre
secondary moulding machine have, during shaping,
a function whereby the resultant force of the
55 shaping internal pressure according to the tyre
specifications open the tyre bead part, in radial tyre
secondary moulding machines of the prior art, the
shaping drum rim is supported in a member such as
a tailstock etc.

60 (Problems to be Solved by the Invention)

In the aforementioned kind of radial tyre
secondary moulding machine of the prior art, the
rim of the shaping drum is supported in a member
such as a tailstock etc, and, as said tailstock etc
65 needs to withstand shaping reaction force and
restrain the displacement of the rim due to
deflection to a minimum, the tailstock etc has
become a large device. Also, in order to solve this
problem, although a shaping drum with a
70 removable rim is well known, in said shaping drum,
as well as a lock mechanism and release
mechanism capable of withstanding shaping
reaction force being complex, it is hard to confirm
whether or not it has been locked and there is the
75 fear of moving to the next process with an
inadequate lock. In addition, if the rim is not held
by the rim's lock mechanism, the rim rotates and
the problem of slipping with the tyre occurs.

As the present invention deals with the
80 aforementioned problems, it relates to a radial tyre
moulding machine having a hollow shaft movable
in the axial direction, a main shaft inside said
hollow shaft with an inserted front end part
protruding out from the front end part of said
85 hollow shaft, a shaft movable in the axial direction
disposed on the extension axis of said main shaft, a
sleeve movable in the axial direction embedded in
the aforementioned hollow shaft, a right inner side
rim flange fixed at the front end part of the
90 aforementioned hollow shaft, a left inner side rim
flange fixed at the front end part of the
aforementioned hollow shaft, a right outer side rim
flange and a left outer side rim flange, and is a

radial tyre moulding machine characterised by having a right side lock mechanism engaging on one side of the aforementioned sleeve and the aforementioned right inner side rim flange
 5 extending from inside of the aforementioned right outer side rim flange side member to the inside and outside in a radial direction, a left side lock mechanism engaging on one side of the aforementioned shaft and the aforementioned left
 10 inner side rim flange extending from inside of the aforementioned left outer side rim flange side member to the inside and outside in a radial direction, a locking member disposed on the opposite surface to the aforementioned right inner side rim flange and aforementioned right outer side
 15 rim flange, and a locking member disposed on the opposite surface to the aforementioned left inner side rim flange and aforementioned left outer side rim flange, with the purpose of the lock mechanism receiving no shaping reaction force and simplifying
 20 the constitution. It is possible for there to be movement to the next process in an adequately locked state. Furthermore, an improved radial tyre moulding machine is provided that can prevent
 25 slipping with the tyre due to rim flange rotation.

(Means for Resolving the Problems)

The present invention, as above, is, concerning a radial tyre moulding machine having a hollow shaft movable in the axial direction, a main shaft
 30 inside said hollow shaft with an inserted front end part protruding out from the front end part of said hollow shaft, a shaft movable in the axial direction disposed on the extension axis of said main shaft, a sleeve movable in the axial direction embedded in
 35 the aforementioned hollow shaft, a right inner side rim flange fixed at the front end part of the aforementioned hollow shaft, a left inner side rim flange fixed at the front end part of the aforementioned hollow shaft, a right outer side rim
 40 flange and a left outer side rim flange, a radial tyre moulding machine characterised by having a right side lock mechanism engaging on one side of the aforementioned sleeve and the aforementioned right inner side rim flange extending from inside of
 45 the aforementioned right outer side rim flange side member to the inside and outside in a radial direction, a left side lock mechanism engaging on one side of the aforementioned shaft and the aforementioned left inner side rim flange extending
 50 from inside of the aforementioned left outer side rim flange side member to the inside and outside in a radial direction, a locking member disposed on the opposite surface to the aforementioned right inner side rim flange and aforementioned right
 55 outer side rim flange, and a locking member disposed on the opposite surface to the aforementioned left inner side rim flange and aforementioned left outer side rim flange, and, as the right side lock mechanism and left side lock
 60 mechanism are inside the right outer side rim

flange side member and the left outer side rim flange side member, no shaping reaction force is received and the constitution is simplified. Also, as, if the right side lock mechanism is not engaged
 65 with the right inner side rim flange the sleeve cannot retract and if the left side lock mechanism is not engaged with the left inner side rim flange the shaft cannot retract, movement to the next process will be made in an adequately locked state.
 70 Furthermore, there is a locking member on the opposite surface to the right inner side rim flange and right outer side rim flange, and a locking member on the opposite surface to the left inner side rim flange and left outer side rim flange, so
 75 slipping with the tyre due to rim flange rotation is prevented.

(Embodiments)

Next, the radial tyre moulding machine of the present invention is described by means of an
 80 embodiment as shown in Figure 1 to Figure 4. First, when describing the constitution of the headstock side, (2) is a hollow shaft movable in the axial direction, (1) is a main shaft inside said
 hollow shaft (2) with an inserted front end part protruding out from the front end part of said
 85 hollow shaft (2), (41) is a shaft movable in the axial direction by means of a cylinder (50) disposed on the extension axis of said main shaft (1), (23) is a bush movable in the axial direction by means of a
 90 cylinder (51) embedded in the aforementioned hollow shaft (2), (21) is a sleeve installed rotatably by means of bearings (22a) (22b) on said bush (23), (14) is a block fixed by means of a bolt (24) on said sleeve (21), (3) is a flange fixed by means of a bolt
 95 (7) on the front end part of said hollow shaft (2), (9) is a right inner side rim flange fixed by means of a bolt (8) on said flange (3), (4) is an annular seal member interposed between the aforementioned main shaft (1) and aforementioned hollow shaft (2),
 100 (5) is an annular seal member interposed between the aforementioned hollow shaft (2) and aforementioned flange (3), (6) is an annular seal member interposed between the aforementioned flange (3) and right inner side rim flange (9), (13)
 105 is a block able to be attached and detached on the aforementioned block (14), (11) is a right outer side flange fixed by means of a bolt (12) on said block (13), (16) is a piston shaped lock pin inserted and fitted so as to be movable to the inside and the
 110 outside in a radial direction at a pin hole disposed on the aforementioned block (13), (9b) is an annular groove disposed on the inner peripheral surface of the aforementioned right inner side rim flange (9), (14b) is an annular groove disposed on
 115 the inner peripheral surface of the aforementioned block (14), (18) is a step part disposed at the inner end aperture of the aforementioned pin hole, (19) is a metal washer fixed on said step part (18), (20) is a spring interposed between said metal washer (19)
 120 and the annular part (34) of the aforementioned

lock pin (16), with said spring (20) being energised towards the outside in a radial direction of the aforementioned lock pin (16). Also, (14a) is a pressurised air passage disposed on the
 5 aforementioned block (14), with said pressurised air passage (14a) opening at the anti-spring side pressure chamber of the aforementioned lock pin (16) by means of a pressurised air passage disposed on the aforementioned block (13); when the right
 10 outer side flange (11) is at the position of Figure 1, pressurised air is fed from said pressurised air passage (14a) to the aforementioned anti-spring side pressure chamber, and, with the aforementioned lock pin (16) moving to the inside
 15 in a radial direction against the spring (20), by engaging with the aforementioned annular groove (14b), and when the right outer side flange (11) is in the position of Figure 2, is exhausted from the aforementioned anti-spring side pressure chamber
 20 through the aforementioned pressurised air passage (14a), the aforementioned lock pin (16) moves to the outside in a radial direction by means of the spring (20), and engages with the aforementioned annular groove (9b). Furthermore, (15a) (15b) are
 25 annular seal members disposed at both sides of the block (13) side aperture of the aforementioned pressurised air passage (14a), and said annular seal members (15a) (15b) form a seal between the blocks (13) (14).

30 Next, to describe the constitution of the anti-headstock side, (25) is a flange fixed by means of a bolt (26) on the front end part (27) of the aforementioned main shaft (1), (30) is a left inner side rim flange fixed by means of a bolt (29) on
 35 said flange (25), (31) (43) are blocks fixed by means of a bolt (47) and said blocks (31) (43) are inserted and fitted so as to be attachable and detachable at the aforementioned shaft (41). Furthermore, (45) is a left outer side rim flange
 40 fixed by means of a bolt (44) on said block (43), (32) is a piston shaped lock pin inserted and fitted so as to be movable to the inside and the outside in a radial direction at a pin hole disposed on the aforementioned block (31), (30b) is an annular
 45 groove disposed on the inner peripheral surface of the aforementioned left inner side rim flange (30), (41a) is an annular groove disposed on the outer peripheral surface of the aforementioned shaft (41), (38) is a step part disposed at the inner end aperture
 50 of the aforementioned pin hole, (39) is a metal washer fixed on said step part (38), (37) is a spring interposed between said metal washer (38) and the annular part (35) of the aforementioned lock pin (32), with said spring (37) being energised towards
 55 the outside in a radial direction of the aforementioned lock pin (32). Also, (43a) is a pressurised air passage disposed on the aforementioned block (43), with said pressurised air passage (43a) opening at the anti-spring side
 60 pressure chamber of the aforementioned lock pin

(32) by means of a pressurised air passage disposed on the aforementioned block (31); when the right outer side flange (45) is at the position of Figure 1, pressurised air is fed from said pressurised air
 65 passage (43a) to the aforementioned anti-spring side pressure chamber, and, with the aforementioned lock pin (32) moving to the inside in a radial direction against the spring (37), by engaging with the aforementioned annular groove
 70 (41a), and when the left outer side flange (45) is in the position of Figure 2, is exhausted from the aforementioned anti-spring side pressure chamber through the aforementioned pressurised air passage (43a), the aforementioned lock pin (32) moves to
 75 the outside in a radial direction by means of the spring (37), and engages with the aforementioned annular groove (30b). Furthermore, the aforementioned lock pin (16), spring (20) and pressurised air passage (14a) equate to a right side
 80 lock mechanism, and the lock pin (32), spring (37) and pressurised air passage (43a) equate to a left side lock mechanism. Also, (3a) (13a) are gear locking members disposed on the opposite surface of the aforementioned right inner side rim flange (9)
 85 and aforementioned right outer side rim flange (11) (block (13)), and (25a) (31a) are gear locking members disposed on the opposite surface of the aforementioned left inner side rim flange (30) and aforementioned left outer side rim flange (45)
 90 (block (31)).

(Operation)

Next, the operation of the aforementioned radial tyre moulding machine is described. When the present radial tyre moulding machine is in the state
 95 of Figure 3, a tyre (52) moulded in a radial tyre primary moulding machine is inserted onto the present radial tyre moulding machine, the bead part (52a) of said tyre (52) is clamped by the right inner side rim flange (9) and the right outer side rim
 100 flange (11), and the bead part (52b) of said tyre (52) is clamped by the left inner side rim flange (30) and left outer side rim flange (45) respectively, and is sealed. At this time, the lock pins (16) (32) move to the inside in a radial direction and engage
 105 with the annular grooves (14b) (41a) of the block (14) and shaft (41). Then, the lock pins (16) (32) are moved towards the outside in a radial direction, and, whilst being detached from the annular grooves (14b) (41a) of the block (14) and shaft (41),
 110 are engaged with the annular groove (9b) of the right inner side rim flange (9) and the annular groove (30b) of the left inner side rim flange (30), and, furthermore, when pressurised air is fed to the inside of the tyre (52), are moved so as to be
 115 mutually close to the right inner and outer side rim flanges (9) (11) and the left inner and outer rim flanges (30) (45) as shown in Figure 4. A breaker (53) is disposed so that its centre is that of the centre of the tyre (52), the right inner and outer rim
 120 flanges (9) (11) are brought even closer to the left

inner and outer rim flanges (30) (45), the tyre (52) is further inflated, the tyre (52) and the breaker (53) are fastened, and a green tyre is moulded. To the extent to which the bead parts (52a) (52b) of the tyre (52) are brought close, the reaction force of the bead parts (52a) (52b) is such that, although the reaction force turns from the direction of the inner side of the tyre to the direction of the outer side of the tyre, when this reaction force is at the anti-headstock side, the left outer side rim flange (45) fixed by the lock pin (32) supports, and when at the headstock side, the right outer side rim flange (11) fixed by means of a lock pin (16) supports. When the tyre has been completed, after the sleeve (21) has been advanced by means of a cylinder (51) and the shaft (41) has been advanced by means of a cylinder (50), and the block (14) has been engaged with the block (14) of the right outer side rim flange (11) and the shaft (41) has been engaged with the blocks (31), (43) of the left outer side rim flange (45), pressurised air is fed from the pressurised air passages (14a), (43a) to the anti-spring side pressure chamber, and the lock pins (16) (32) are detached from the annular grooves (9b) (30b) and engaged with the annular grooves (14b) (41a); then, the sleeve (21) is drawn back by means of a cylinder (51) and the shaft (41) is drawn back by means of a cylinder (50), the right outer side rim flange (11) is disconnected from the right inner side rim flange (9), the left outer side rim flange (45) is disconnected from the left inner side rim flange (30), and the completed tyre is taken out.

(Effects of the Invention)

The present invention, as above, is, concerning a radial tyre moulding machine having a hollow shaft movable in the axial direction, a main shaft inside said hollow shaft with an inserted front end part protruding out from the front end part of said hollow shaft, a shaft movable in the axial direction disposed on the extension axis of said main shaft, a sleeve movable in the axial direction embedded in the aforementioned hollow shaft, a right inner side rim flange fixed at the front end part of the aforementioned hollow shaft, a left inner side rim flange fixed at the front end part of the aforementioned hollow shaft, a right outer side rim flange and a left outer side rim flange, a radial tyre moulding machine characterised by having a right side lock mechanism engaging on one side of the aforementioned sleeve and the aforementioned right inner side rim flange extending from inside of the aforementioned right outer side rim flange side member to the inside and outside in a radial direction, a left side lock mechanism engaging on one side of the aforementioned shaft and the aforementioned left inner side rim flange extending from inside of the aforementioned left outer side rim flange side member to the inside and outside in a radial direction, a locking member disposed on the opposite surface to the aforementioned right

inner side rim flange and aforementioned right outer side rim flange, and a locking member disposed on the opposite surface to the aforementioned left inner side rim flange and aforementioned left outer side rim flange, and, as the right side lock mechanism and left side lock mechanism are inside the right outer side rim flange side member and the left outer side rim flange side member, no shaping reaction force is received and the constitution is simplified. Also, as, if the right side lock mechanism is not engaged with the right inner side rim flange the sleeve cannot retract and if the left side lock mechanism is not engaged with the left inner side rim flange the shaft cannot retract, movement to the next process will be made in an adequately locked state. Furthermore, there is a locking member on the opposite surface to the right inner side rim flange and right outer side rim flange, and a locking member on the opposite surface to the left inner side rim flange and left outer side rim flange, so there is the effect that slipping with the tyre due to rim flange rotation can be prevented.

Although the above is a description of the present invention by means of an embodiment, the present invention is, of course, not limited to this type of embodiment, and a number of design changes can be implemented as long as they do not deviate from the spirit of the present invention.

4. [Brief Description of the Drawings]

Figures 1 and 2 are longitudinal side views showing an embodiment of the radial tyre moulding machine relating to the present invention, Figure 3 is an operational illustration of the state at the start of the moulding and Figure 4 is an operational illustration of the state at the completion of the moulding.

(1) ... main shaft, (2) ... hollow shaft, (3a), (13a) ... locking member, (9) ... right inner side rim flange, (11) ... right outer side rim flange, (14a), (16), (20) ... right side lock mechanism, (25a), (31a) ... locking member, (32), (37), (43a) ... right side lock mechanism, (30) ... left inner side rim flange, (45) ... left outer side rim flange.

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¹Translator believes 'right side lock mechanism' is a mistake and should be 'left side lock mechanism' as (32) (37) (43a) are referred to as a left side lock mechanism in other instances in the source JP text.

Figure 1

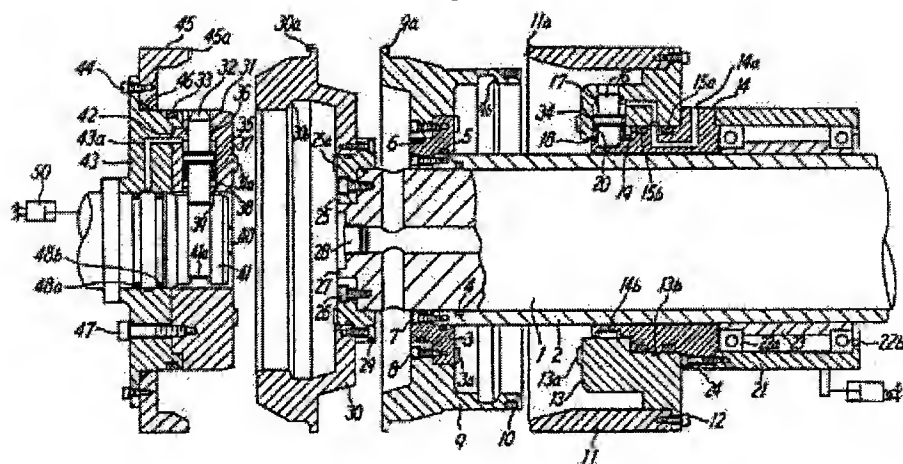
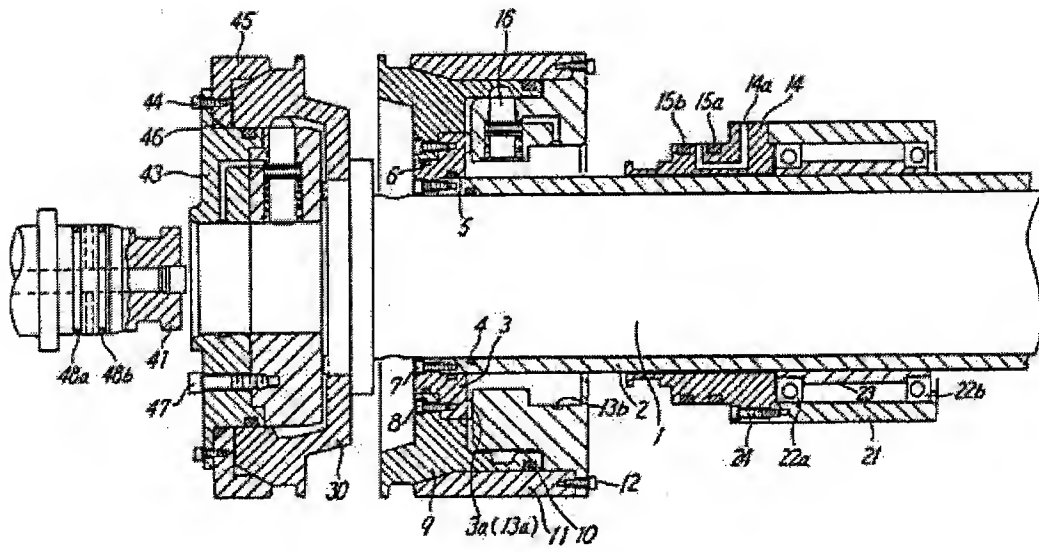
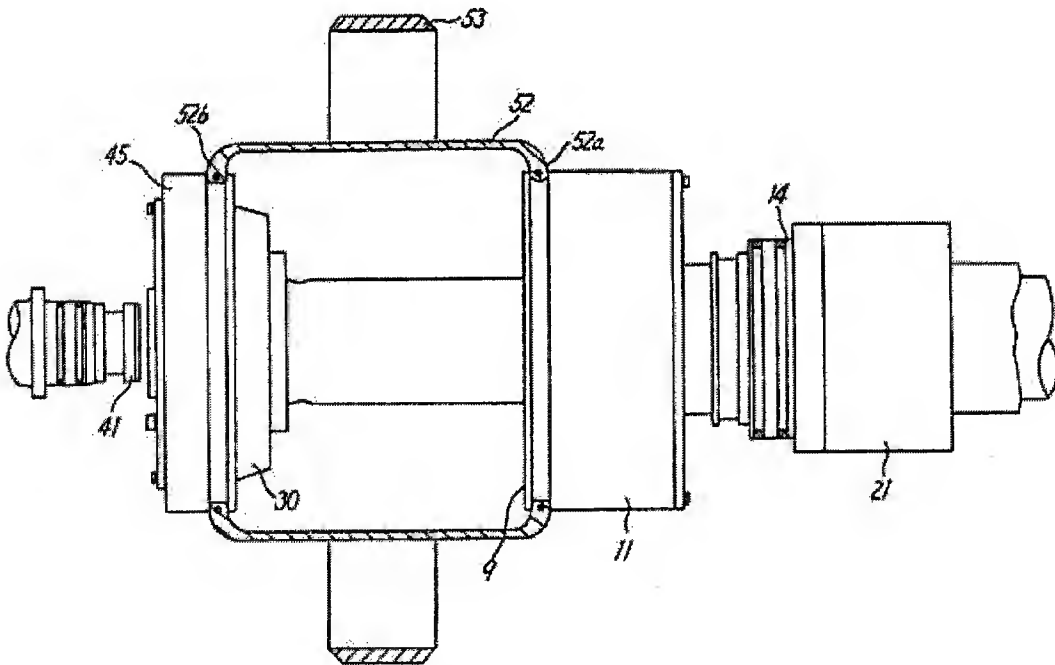


Figure 2



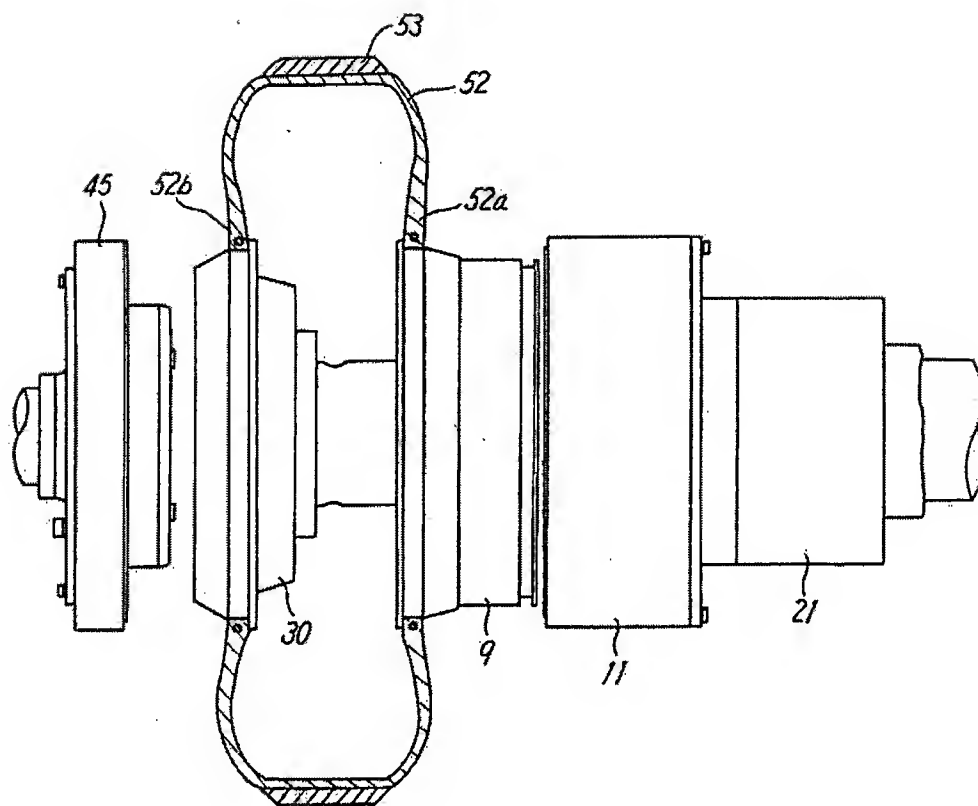
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Figure 3



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Figure 4



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